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Trifluoroacetic Acid Level in the Atmosphere of Beijing and Its Relationship with PM2.5

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Atmospheric concentrations of Trifluoroacetic Acid (TFA), one of the main degradation products of HCFC-123, HCFC-124 and HFC-134a, were detected in Beijing, China between 2013 and 2014. By analyzing the 137 atmospheric samples, the results showed that the annual mean atmospheric concentration of TFA was 1459±223 pg•m-3. TFA was mainly distributed in gaseous phase, for the concentration was 1396±225 pg•m-3, while that in particle phase was 62±8 pg•m-3. Considering the frequent occurrence of hazy weather in Beijing, the relationship between TFA and PM2.5 in atmosphere was analyzed. The correlation analysis shows that the proportion of particle phase in atmosphere concentration of TFA and mass concentration of PM2.5 are positively correlated with each other (P<0.001), indicating the particles have an absorption effect on TFA. At the same time, when mass concentration of PM2.5 in atmosphere is high, atmospheric concentration of TFA is relatively low. According to the correlation analysis, mass concentration of PM2.5 and atmospheric concentration of TFA are negatively correlated with each other (P=0.005). The main reason is very likely that particle's extinction for light can be enhanced as particle level rises, which causes TFA precursors photolysis to weaken. The results indicate that PM2.5 has a significant impact on TFA.